Is air pollution worse indoors than out?

In terms of some organic chemicals, "your home may be more of a toxic-waste hazard than Love Canal or the chemical company nearby," says Lance Wallace, an environmental scientist working at the Harvard School of Public Health in Boston. At the recent American Chemical Society national meeting in Chicago, Wallace presented results of a new Environmental Protection Agency (EPA) study showing that levels of volatile organic chemicals are typically much higher indoors than out, regardless of whether one lives next door to a chemical factory or a wheat field.

That's important, notes John Spengler, also at the Harvard School of Public Health, because people spend an average of 21 to 23 hours per day indoors. In fact, Wallace says, according to standard EPA risk calculations, these data suggest that at least several hundred deaths a year in the United States may be attributable to air pollution encountered in the home.

The data were collected as part of EPA's TEAM (for Total Exposure Assessment Methodology) study. Begun in 1979, the five-year program developed methods to measure individual exposures to potentially toxic chemicals and correlated these exposures with concentrations of the same materials measured in the blood, breath and urine of monitored participants. The goal was to estimate how pollution exposures vary across an entire urban population and to identify which factors contribute most to health risks.

The study focused on 350 people in Bayonne and Elizabeth, two highly industralized New Jersey cities. Individuals were fitted with monitors that slowly and continuously sampled the air about them for 20 organic chemicals over two consecutive 12-hour periods. At the same time, similar monitors in 100 backyards recorded outdoor levels. Besides blood and urine tests, each of the participants was given a breath test at the end of the 24-hour air-sampling phase, and a questionnaire to profile their activities.

Bayonne, as the home of nine major petrochemical companies, was chosen because of suspicions that its heavily polluted outdoor environment might contribute to high indoor air pollution. Elizabeth is also noted for its heavy industrial base. Ironically, Wallace says, "Persons living close to the major point sources (chemical, paint, plastics and petroleum processing plants) showed no greater exposures or body burdens than persons living far away." However, individual exposures to the measured pollutants could be quite variable — sometimes differing by a factor of 100 or more among persons living on the same block.

"Perhaps the most important finding," Wallace says, "has been the discovery that indoor levels of all the target chemicals are much greater than outdoor levels" — in some cases up to 100 times higher than outdoors. And this observation is not restricted to New Jersey. Comparison studies that EPA conducted in Greensboro, N.C., a light-industry area, and Devils Lake, N.D., a rural and relatively pristine area, show the same high indoor-pollution levels exhibited in New Jersey. Wallace says it therefore appears that, in terms of these 20 chemicals, "living in almost any town in the United States is as hazardous as living in a polluted urban area."

Although "this was very difficult for us to accept," Wallace says, "we had to conclude that the major sources of exposure were indoors." What these sources are have not been established, though he says it seems probable that they are consumer products such as paints, cleansers, propellants, plastics and cosmetics, and building materials such as adhesives, fixers, resins and insulation.

However, the questionnaires did turn up some correlations between specific activities and pollutants measured in the breath. For example, spending a few minutes at the gas station to fill up one's tank appears to leave a residue of benzene in the breath that can be detected hours later. Similarly, a short visit to the dry cleaner's imparts a telltale mark of tetrachloroethylene in the breath. And hot showers elevate breath levels of chloroform, which is released from chlorinated water.

Wallace also reports a strong correlation between smoking and breath levels of benzene, styrene, xylene and ethylbenzene. These chemicals were twice as high in smokers as in nonsmokers, regardless of their exposures to anything else. Perhaps most troubling, he notes, benzene levels were 30 to 50 percent higher in the homes of smokers than in those of nonsmokers. Of all the chemicals studied in the TEAM project, only benzene has been established as a human carcinogen. Seventy-three percent of the New Jersey households surveyed by TEAM contained at least one smoker.

Wallace worries that the higher prevalence of benzene in smoking households may spell an elevated leukemia risk for children growing up in such a polluted atmosphere. In fact, he says, it may partially explain some of the excess leukemias, reported earlier this year, among the children of smokers (SN: 5/18/85, p. 312).

—J. Raloff

Gene splicing: 'Final' federal plan

The latest White House proposal to involve itself in regulating genetic engineering in the United States was met this week with skepticism from scientists. Bernadine Healy of the President's Office of Science and Technology Policy (OSTP) presented the "final iteration" of a plan to coordinate biotechnology decisions of different federal agencies. She described the proposed mechanism to a meeting in Bethesda, Md., of the National Institutes of Health (NIH) Recombinant DNA Advisory Committee (RAC), the original, and most prestigious, group that sets policy on gene splicing. At that meeting the RAC also prepared itself to receive imminent proposals for human genetic engineering; the committee unanimously approved its document called "Points to consider in the design and submission of human somatic-cell gene therapy protocols."

The new White House proposal outlines a two-tiered system for consideration of genetic engineering. Each of the agencies that funds or regulates gene splicing work would maintain or set up its own scientific review mechanism, such as NIH's RAC. These groups would review the detailed applications submitted by researchers and commercial groups.

In a change from a previous OSTP proposal, the top tier of the system would include a new interagency committee under the auspices of OSTP's Federal Coordinating Council for Science, Engineering and Technology (FCCSET, pronounced "fix-it"). The committee would be composed of "high-level" administrators from each relevant agency: NIH, the National Science Foundation, the Food and Drug Administration (FDA), the Environmental Protection Agency and the Department of Agriculture.

The FCCSET committee would develop scientific policy to be used by all the agencies, Healy says. But it would not have any authority to force agencies to abide by its recommendations, nor would it decide jurisdictional disputes among the agencies. Its power would derive, Healy says, from "the clout of science, and science alone."

The RAC members expressed two objections to the proposal. First, they were concerned that public confidence would be undermined because the deliberations of the FCCSET committee would not be open to the public. Second, they felt little need for a higher advisory body. "This FCCSET might not have a lot to do," says Bernard Davis of Harvard Medical School.

One area where jurisdictional disputes are expected is human gene therapy. At the meeting the RAC approved its "Points to consider ...," which include a statement that the document applies only to work at institutions receiving NIH support for recombinant DNA research and a footnote that the FDA has jurisdiction over drug products to be used in clinical trials (SN: 8/31/85, p. 141). The first proposals will probably need approval by both the RAC and FDA. Bernard Talbot of NIH says, "The RAC is set to go." *— J.A. Miller*